1. An integrated miniaturized system for chemical analysis of fluids, comprising:

an electrospray substrate having an injection side and an ejection surface, the substrate defining an entrance orifice on the injection side, a nozzle on the ejection surface, a channel extending between the entrance orifice and the nozzle, and a region surrounding the nozzle recessed from the ejection surface; and

electrode means for providing electrical contact to the fluids.

2. The system of claim 1, wherein said electrode means comprises an external conductor in contact with the fluid prior to said injection side.

3. The system of claim 1, wherein the channel has a cross-sectional area less than approximately 50,000 μm^2.

4. The system of claim 1, wherein the substrate defines a plurality of entrance orifices on the injection side, a plurality of nozzles on the ejection surface each corresponding to one of the plurality of entrance orifices, a plurality of channels each extending between one of the plurality of nozzles and the corresponding one of the plurality of entrance orifices.

5. The system of claim 4, wherein an array of said plurality of nozzles are radially positioned on the ejection surface of the electrospray substrate.

6. The system of claim 1, further comprising a device in fluid communication with the entrance orifice.

7. The system of claim 1, wherein an array of nozzles are defined on the ejection surface of the electrospray substrate, and further comprising a daughter plate defining a plurality of receiving wells positioned to receive a fluid ejected through the nozzles of the electrospray substrate.

8. The system of claim 1, further comprising a second substrate defining an entrance opening on a first surface and an exit on a second surface, the second substrate being bonded to the electrospray substrate such that the second substrate exit is in fluid communication with the electrospray substrate entrance orifice.

9. The system of claim 1, further comprising a second substrate defining an entrance opening on a first surface, an exit on a second surface, a fluid reservoir recessed from the second surface, a separation channel recessed from the second surface, the separation channel including the exit and extending between the reservoir and the exit, an introduction channel extending between the entrance opening and the reservoir, and a plurality of posts extending from the separation channel, wherein the second substrate is bonded to the electrospray substrate to enclose the reservoir and the separation channel

WORKMAN, NYDEGGER & SEELEY
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

adjacent the electrospray substrate and such that the second substrate exit is in fluid communication with the electrospray substrate entrance orifice.

WORKMAN, NYDEGGER & SEELEY
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

09702955.102600

WORKMAN, NYDEGGER & SEELEY
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

DOCKET # 14917.1.4

10. An electrospray device comprising:

an array of nozzles integrated in a substrate for ejecting a plurality of analytes at a mass spectrometry device interface; and

a plurality of electrodes for the application of electric potentials for generating and controlling an electric field at each nozzle to direct the ejection of the analytes from the nozzles within an acceptance region of the mass spectrometry device.

11. A method for generating an electrospray of a fluid, comprising:

providing a channel extending between an entrance orifice defined on an injection surface of a substrate and a nozzle defined on an ejection surface of the substrate;

introducing a fluid into the channel through the entrance orifice;

providing a first electrode in electrical contact with the fluid;

applying a first potential voltage to the fluid;

positioning the nozzle adjacent to an extracting electrode; and

ejecting the fluid from the channel through the nozzle by applying or holding the extracting electrode at a second potential voltage different from the first potential voltage.

12. The method of claim 11, further comprising:

providing a second electrode in electrical contact with the substrate; and

applying a third potential voltage to said second electrode, different from said first potential voltage.

WORKMAN, NYDEGGER & SEELEY
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

00TE0T " 55620460

13. A liquid chromatography system, comprising:

a first substrate having a first surface and a second surface, the first substrate defining an entrance opening on the first surface, a fluid reservoir recessed from the second surface, a first channel extending between the entrance opening and the reservoir, a second channel recessed from the second surface, and a plurality of posts extending from the second channel; and

a cover substrate bonded to the first substrate to enclose the reservoir and the second channel adjacent the cover substrate,

wherein the first and/or the cover substrate defines an exit and wherein the second channel extends between the exit and the reservoir.

14. The liquid chromatography system of claim 13, further comprising an insulating layer provided over the surfaces of the separation channel and the plurality of posts.

15. The liquid chromatography system of claim 13, wherein the posts are spaced apart from each other by no more than 5 μm.

16. The liquid chromatography system of claim 13, wherein the first substrate defines a plurality of entrance openings on the first surface, a plurality of reservoirs recessed from the second surface each corresponding to one of the plurality of entrance openings, one or more first channels each corresponding to and extending between one of the plurality of entrance openings and the corresponding reservoir, and a plurality of second channels recessed from the second surface, wherein the first and/or the cover substrate defines a plurality of exits each corresponding to one of the plurality of reservoirs, and wherein each second channel corresponds to and extends between one of the plurality of reservoirs and the corresponding exit.

WORKMAN, NYDEGGER & SEELEY
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

DATE: 5/5/2000

17. A chemical separation device comprising:

a substrate defining a channel,

a plurality of posts fabricated from said substrate and extending from said channel, and

a stationary phase bound to the posts, said posts providing interaction with an analyte introduced into said channel for producing separation.

WORKMAN, NYDEGGER & SEELEY
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

09701 0 " 556260

Docket No. 14917.1.4
October 26, 2000

18. An integrated chemical analysis system, comprising:

a first substrate having a major surface;

a second substrate bonded to or otherwise attached to said first substrate;

a liquid chromatography system integrated in said second substrate, and configured to receive a fluid for analysis and to process and output the fluid; and

an electrospray device integrated on said first substrate, the electrospray device having an injection surface configured to receive the processed fluid from the liquid chromatography system, the major surface being configured to dispense the fluid by electrospraying the fluid.

19. The system of claim 18, wherein the major surface of the electrospray device is configured to dispense the processed fluid in a direction generally perpendicular to the major surface.

20. The system of claim 18, wherein a plurality of liquid chromatography systems are each integrated in said second substrate, and each configured to receive a fluid for analysis and to process and output the fluid; and a plurality of electrospray devices, each integrated on said first substrate, the electrospray devices each having an injection surface configured to receive the processed fluid from the liquid chromatography system, and each having an ejection surface configured to dispense the fluid by electrospraying the fluid.

WORKMAN, NYDEGGER & SEELEY
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

21. A system comprising:

a microfabricated device defining a liquid chromatography device comprising an entrance for receiving an analyte, the device further defining an electrospray device including a nozzle, the electrospray device being configured to receive the analyte from the liquid chromatography device and to generate an electrospray; and

a mass spectrometer comprising a sampling orifice, said microfabricated device being positioned to eject the electrospray from the nozzle into the sampling orifice.

WORKMAN, NYDEGGER & SEELEY
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

DOCKET "14917.1.4"

22. A method of mass spectrometric analysis utilizing an integrated chemical analysis device comprising:

a first microfabricated structure defining a liquid chromatography device comprising an entrance for receiving an analyte and an exit; and

a second microfabricated structure defining an electrospray device including an entrance for receiving the analyte from the liquid chromatography device and a nozzle in fluid communication with the entrance, the electrospray device to generate an electrospray and wherein the electrospray nozzle is adapted to eject the electrospray from the nozzle into a sampling orifice of a mass spectrometer.

add c2

WORKMAN, NYDEGGER & SEELEY
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

DOCKET # 14917.1.4